

Mastery and fluency

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[Developing Fluency Outside of the Maths Lesson in a Primary School](#)

Why did you choose to develop mastery and fluency in Mathematics?

With the new curriculum, there is a higher demand for fluency in children. Some of the sample papers show complex problems which would require good number sense. Research has shown that if children are fluent in their number facts, they will find it easier to access these calculations, so we felt it was important to make sure that children were receiving this support. Many of the children in our school have poor number fluency. They are excited by maths and eager to learn but retention is a problem for many of our children.

In what ways were you planning to develop Mastery in fluency?

In our school, we wanted to target fluency and number sense both in school and at home. Many of our parents wanted to support their children with fluency but didn't know the best way to do this. We wanted to give them guidance so that they knew what to work on other than times tables and number bonds. We also wanted a structured system that progressively challenged the children right the way from Year 1 up to Year 6 with their fluency. However, we didn't want to leave the teaching of fluency entirely to our parents. We also didn't want our maths lessons to become an hour of rote learning. We wanted to make our maths lessons engaging and based upon reasoning skills and real life scenarios. For this reason we decided to devote an extra 10 minutes of the day to our maths facts outside of the maths lesson. We wanted to develop a system that would have the greatest impact with the least amount of time spent, and the least amount of teacher preparation.

What did your project involve?

Fluency at home To develop fluency at home, key fact sheets were developed. (See Appendix 2 for an example) Six were designed for each year group, so that children would be able to work on one each half term. The fluency progression ladder (Appendix 1) shows how these become progressively harder. Initially, it was planned that these would be named by the term in which they should go home e.g. Year 1 Autumn 2. However, we realised that many of our children might have already mastered a particular set of facts, while many others were working at a level below their age related expectations. For this reason, we decided instead to number them from 1 to 36. This meant that teachers could give out the appropriate sheet to different individuals. The fact sheets listed the key facts for that objective that parents should practice at home, with the expectation that by the end of the half term each child should have learnt their facts.

Fluency in school To develop fluency in school, we decided to devote 10 minutes per day to Fast maths, which had been introduced to us through our work with the NAHT Aspire Network. During this 10 minutes, children are given a 5 x 5 blank table, with 5 randomised numbers across the top and sides. The numbers are different each day. The children then have 3 minutes to complete the

grid by adding the numbers together. We value accuracy over speed. While the children are working, they have access to a completed addition square. This means that if they needed to, they could use it to find the answer. However, most children just add the numbers together mentally. Due to the importance of accuracy, if children make 3 errors on their grid they score 0 for the day. The children all agreed this was fair, and so now this rarely happens. We felt it was important not to damage self-esteem by making it too competitive, so the children only compete against their own personal bests and 'top scores' are not celebrated. Instead, we celebrate improvements

+	1	2	3	4	5
1					
2					
3					
4					
5					

What did you find out throughout carrying out your project?

Initially, with the Fast maths, we were concerned about the impact it would have, and whether children would enjoy it. If children make 3 or more errors, they receive a score of 0 for the day, and we were worried that some of our children wouldn't like this and it could ruin their enjoyment of maths. We also weren't sure about giving the children the addition square to find answers on, as initially we felt that it would be a case of them copying and therefore not learning. However, when KS1 children were questioned about Fast maths, every child said they enjoyed it and were eager to tell me about their own personal bests. Teachers have commented about how focused children are during this time and some of our year 5 teachers have seen a great improvement in the fluency for addition facts in their class.

What differences did it make to your learners?

By sending the key facts home, it has made an indirect difference to our learners by giving parents more understanding and control over their child's mathematical learning.

The Fast maths has had a more immediate impact, however, which is more easily assessed. Previously, many of our children didn't know their addition facts. After 3 months of Fast maths, years 5 and 6 are now completely secure in these, and have moved onto multiplication grids for Fast

instead. In year 2 in November, 37% of our class of 27 received a score of less than 10 out of 25 at the end of the first week of Fast. After nearly 3 consistent months of doing it on a daily basis, we now usually have only one or two children scoring less than 10. The majority score full marks and are now competing with themselves to do it in quicker times. We are yet to assess how this has impacted upon their accuracy when applying these skills in other contexts.

What difference did it make to your school?

One target which our school has been working on is consistency. We believe it's important for our values, policies and beliefs to be consistent across the school. The key facts and Fast maths has been one way in which KS1 and KS2 have been consistent in their approaches. Every child can talk to you about them and every parent understands them. It has become a part of our daily routine which we now wouldn't go without.

What did you learn yourself?

Throughout this project, I've learnt about just how vital fluency is in developing as a mathematician. So many things that we take for granted each day are because of our fluency in maths. For example, being able to tell the time, or read the speed gauge on our cars. I also learnt that while I always want our maths lessons to be fun, engaging, practical and creative, there is a place for practice too. I've always despised the idea of rote learning, however our children do need short periods of time just for practice in order to really embed a skill and become fluent.

APPENDIX 1

Fluency Progression Ladder

Below shows the expectations, according to the National Curriculum, for each year group. Due to the higher expectations of the new National Curriculum, you may find many of your children initially needing a lower year group's KIRFs.

KIRFs are labelled numerically. Children must progress in this order through the KIRFs and must have mastered the facts before moving on (must be able to recall instantly when asked as well as apply the knowledge). Children to be given new KIRFs each half term.

<u>Year Group Expectation</u>		<u>Objective</u>
EYFS		Count objects reliably up to and beyond 10. Recognise numerals to 10. Say one more or one less than a number. Begin to use mathematical names for common 2D and 3D shapes. Use mathematical positional language to describe the position of an object (behind, next to) Order single digit numbers. Compare amounts using comparison language (more, less).
Year group	KIRFs	Objectives
Year 1	1 2 3 4 5 6	To know days of week and months of year. To know bonds for each number up to 6. To know bonds to 10. To know doubles and halves to 10. To tell the time to the nearest half hour. To know bonds for each number up to 10.
Year 2	7 8	To know bonds to 20. To know 2 x table and division facts.

	9 10 11 12	To know doubles and halves to 20. To know 10 x table and division facts. To tell the time to the nearest 5 minutes. To know 5 x table and division facts.
Year 3	13 14 15 16 17 18	To know bonds to every number to 20. To know 3 x table and division facts. To recall facts about time. To know 4 x table and division facts. To tell the time to the nearest minute. To know 8 x table and division facts.
Year 4	19 20 21 22 23 24	To know bonds to 100. To know 6 x table and division facts. To know 9 x table and division facts. To know 11 x table and division facts. To know 7 x table and division facts. To multiply and divide any single digit number by 10 and 100.
Year 5	25 26 27 28 29 30	To know decimal equivalents of fractions. To know decimal bonds to 1 and 10. To know all multiplication and division facts to 10 x 10. To know metric conversions. To know all prime numbers up to 20. To know all multiplication and division facts up to 12 x 12.
Year 6	31 32 33 34 35 36	To find factor pairs for numbers up to 100. To know square numbers to 12^2 and square roots. To identify common factors of pairs of numbers. To convert between fractions, decimals and percentages. To identify prime numbers to 50. To know Roman numerals.

APPENDIX 2

Example of a KIRF: Key Instant Recall Facts

Available from the Great Linford Primary School website

<http://greatlinfordprimaryschool.co.uk/our-curriculum/maths/>



Key Instant Recall Facts Target 20

By the end of this half term, you should know the following facts. The aim is to recall these facts instantly. You should also be familiar with using the key vocabulary.

$6 \times 1 = 6$	$1 \times 6 = 6$
$6 \times 2 = 12$	$2 \times 6 = 12$
$6 \times 3 = 18$	$3 \times 6 = 18$
$6 \times 4 = 24$	$4 \times 6 = 24$
$6 \times 5 = 30$	$5 \times 6 = 30$
$6 \times 6 = 36$	$6 \times 6 = 36$
$6 \times 7 = 42$	$7 \times 6 = 42$
$6 \times 8 = 48$	$8 \times 6 = 48$
$6 \times 9 = 54$	$9 \times 6 = 54$
$6 \times 10 = 60$	$10 \times 6 = 60$
$6 \times 11 = 66$	$11 \times 6 = 66$
$6 \times 12 = 72$	$12 \times 6 = 72$

Key
vocabulary

Multiply

Divide

Multiples

Equals

They should be able to answer these questions in any order, including missing number questions e.g. $6 \times \bigcirc = 72$ or

Top Tips!

- Practice little and often. Use your time wisely – could you practise on the way to school or while waiting in a queue at the supermarket?
- Songs and Chants – Can you roll your numbers? "Year 4, here we go, let me see your fingers roll the ones!" You can also buy Times Tables CDs or find multiplication songs and chants online. If your child creates their own song, this can make the times tables even more memorable.
- Double your halves – Multiplying a number by 6 is the same as multiplying by 3 and then doubling the answer. $7 \times 3 = 21$ and double 21 is 42, so $7 \times 6 = 42$.
- Fact families – If your child knows one fact (e.g. $2 \times 2 = 4$), can they tell you the other three facts in the same fact family?
- Warnings! – When creating fact families, children sometimes get confused by the